Requirements Document
for
Operational Data Management System:
United States Notice to Airmen System

Replacement Only

Approved by: _____ Date: 5/15/98
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1. BACKGROUND.

The Operational Data Management System (ODMS) is the planned national repository for National Airspace System (NAS) data which includes airport/airspace configurations, operations, environment and resources. ODMS will collect, validate, store, maintain and disseminate essential aeronautical data pertaining to the operation of the NAS.

The ODMS Operational Requirements Document (ORD), Version 1.0 dated April 1994, identified the critical mission performance parameters that serve as the basis for subsequent acquisition phases. Version 1.0 of the ODMS ORD focused on the full operational capability requirements for the Aeronautical Information Subsystem. The Aeronautical Information Subsystem is designed to replace and upgrade the functionality of two current, though technologically obsolete, systems - the United States Notice to Airmen (NOTAM) System (USNS) and the Aeronautical Information System (AIS). A subsequent Volume 2 of the ODMS ORD was prepared in 1995 and identified requirements for the two other subsystems of ODMS, the National Operational Data Archive (NODA) and Obstruction Evaluation/Airport Airspace Analysis (OE/AAA).

This replacement only Requirements Document (RD) identifies the requirements for an interim phase of the ODMS. This interim phase concentrates on the requirements for the USNS replacement that would allow for shutdown of the old system. This interim phase will not satisfy all of the enhanced functional requirements identified in Version 1.0 of the ODMS ORD. It only provides a platform that will sustain current operations.

1.1 Current System Deficiencies.

Hardware and system software obsolescence, lack of parts availability and capacity shortfalls are critical USNS deficiencies. In addition, the system is not Year 2000 compliant.

1.2 Objectives.

The objectives are to: (1) replace the existing USNS with a modern, maintainable and expandable platform capable of performing all existing functions while minimizing life cycle operating and support costs and (2) relocate/consolidate the existing system capability to Air Traffic Control System Command Center (ATCSCC) at Herndon, VA.

1.3 Current USNS Capability.

The USNS is a safety-critical system that is used to collect, maintain and disseminate NOTAMs to the aviation community. NOTAMs provide information on temporary and immediate changes to the condition of NAS resources (e.g., runways, navigational aids, lighting) and procedures that are involved in flight operations.

The USNS consists of the Consolidated NOTAM System (CNS) and USNOF specialist workstations. The CNS is located in the EDS Information Management Center in Plano, Texas.

The USNS workstations are located at the Air Traffic Control System Command Center (ATCSCC) in Herndon, VA. The U.S. NOTAM Office will operate 24 hours a day, 7 days a week, 365 days a year.

Figure 1-1 depicts the current NOTAM data flow. The left side identifies information sources that report on changes to the NAS. Sources include state inspectors, airfield management, civilian operators, pilots, Federal Aviation Administration (FAA) offices, international sources, military operators and air traffic controllers. This group comprises those personnel who, by nature of their occupation, are required to report changes in resources that could affect flight operations.

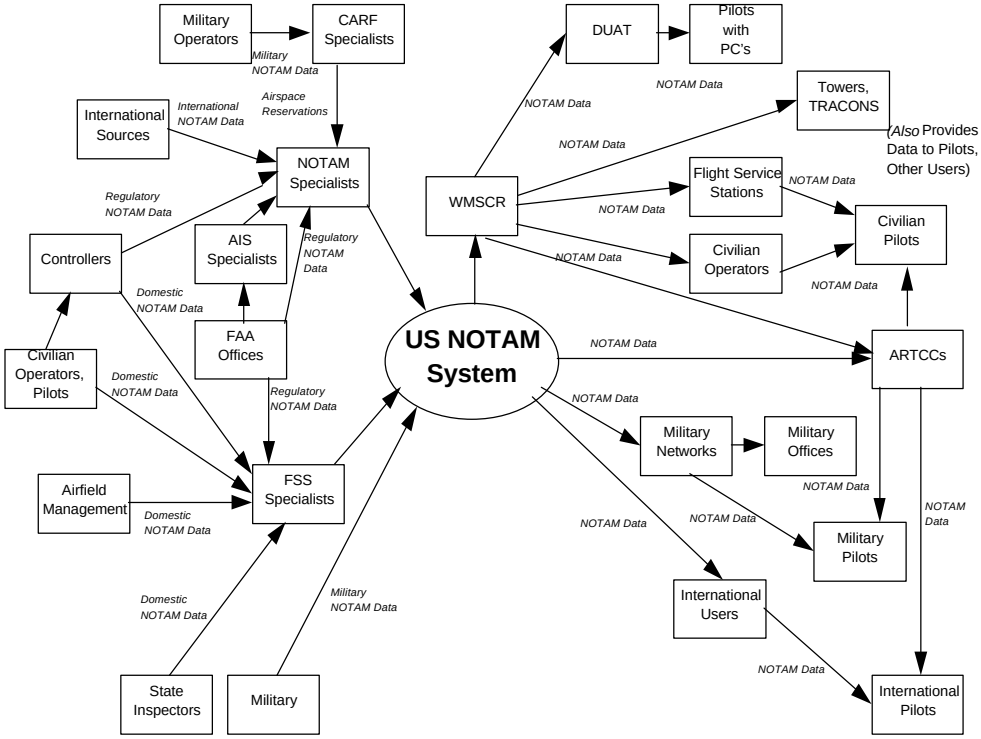

Figure 1-1 Current Processed NOTAM Flow

2.0 OPERATIONAL AND SUPPORT CONCEPTS

This section describes the operational concept for the USNSR.

2.1 Operations.

NOTAM Office specialists will enter/update NOTAM data through a Computer Human Interface (CHI). NOTAM Office specialists will have full access and control of the system and data. Other users are external to the system and will have only message based access. Other users will send message-based NOTAM data and service request queries. Other users will have no system control capabilities.

The system will automatically prepare and deliver standard products such as NOTAMs and NOTAM reports. The NOTAM Distribution Function will send NOTAMs to users according to the distribution tables. The NOTAM Distribution Function will generate the standard products now produced from USNS data. Users will be able to specify the locations of interest for international NOTAMs. In this way a user will only receive selected international NOTAMs.

NOTAM Office specialists will maintain distribution tables. Through the distribution tables' communications addresses, the source and recipients of NOTAMs are designated. The system administrator or operator will perform backup and recovery, performance monitoring and data archiving functions.

The Service Request Function will provide data query and analysis tools. Standard queries will be available along with the capability to create customized routines. Statistical output will be available in the form of tables. The system will be capable of retrieving and analyzing current and limited historical data. Historical data will include transaction archives (limited), database snapshots and the ability to reconstruct and analyze events.

In order to exchange data with other systems, the system will have automated interfaces with external systems within and outside of the NAS. Examples are:

- International NOTAM systems
- Military NOTAM Distribution Systems,
- Weather Message Switching System Replacement,
- Department of Defense (DoD), Global Positioning System (GPS) NOTAM Generator System

The system will accept data from external systems and perform validation of the affected location and NOTAM accountability. Limited checking and correction of NOTAM content will occur based on format and syntax rules.

2.2 Support.

The system will support a software development and maintenance environment that will provide the capability to develop and test new software and maintain operational software.

Contract support services will be required to maintain and support the system. Support services will include application software maintenance, database administration, computer and network operations and server hardware maintenance. The FAA will be responsible for overall system policy, system management, data management and configuration management.

Operational requirements necessitate 24 hour, 7 day continuous maintenance support. The FAA will provide contract management and oversight. All hardware and software maintenance activities will be documented in conformance with configuration management procedures.

2.3 Quantities and Location.

There will be one system and the location will be the ATCSCC at Herndon, VA.

2.4 Schedule Constraints.

Rapid implementation is desirable due to the questionable sustainability of the current system and its non compliance with the Y2K issue.

3.0 REQUIRED CAPABILITIES.

This section presents the requirements for the USNSR.

3.1 Operational and Functional Requirements.

3.1.1 NOTAM Creation.

3.1.1.1 Create. The system shall provide the capability for NOTAM Office specialists to create NOTAMs in domestic, military, international and FDC formats as described by FAA Order 7930.2.

3.1.1.2 Service B. The system shall provide the capability for NOTAM Office specialists to create NOTAMs from Service (SVC) B administrative messages.

3.1.1.3 Edits. The system shall provide the capability for NOTAM Office specialists to edit NOTAMs.

3.1.1.4 Formats. The system shall provide the capability to receive and process NOTAM input data in all existing formats currently used by the USNS. The existing formats include FAA and ICAO formats and multi-part NOTAMS. When the data or format is in error, the system shall create an error message that describes the error.

3.1.1.5 External Sources. The system shall receive and process finished NOTAM products from external sources. Finished NOTAM products are defined as NOTAMs that have been numbered and validated by an external source, such as foreign NOTAM offices.

3.1.1.6 Process. The system shall receive and process proposed NOTAM products from U.S. originators. The proposed NOTAM products shall be numbered by the system when determined to be valid.

3.1.1.7 Error Messages. The system shall identify specific error types and generate an error message.

3.1.1.8 Rejection Notice. The system shall prepare a notice of rejection and route the notice to the NOTAM Office specialist and the originator.

3.1.1.9 Military Text. The system shall provide the capability to create and store customized military text for NOTAMS at locations that the DoD has identified as reportable.

3.1.2 NOTAM Data Maintenance.

3.1.2.1 U.S. Origination. The system shall be capable of automatically identifying U.S. originated NOTAMs that potentially require international dissemination by referring to a list created by the user in the system which specifies the locations for international distribution.

3.1.2.2 International. The system shall provide the NOTAM Office specialist with the NOTAM condition data (E: field) from a domestic NOTAM with international interest.

3.1.2.3 Domestic/International Link. The system shall maintain a logical linkage between the domestic and international NOTAM so that cancellation of the domestic NOTAM automatically cancels the international NOTAM.

3.1.2.4 Identify DoD NOTAMS. The system shall automatically identify NOTAMs that are of interest to the DoD by referring to a list created by the user in the system which specifies the locations of DoD interest.

3.1.2.5 Translation. The system shall translate NOTAM text from either French or Spanish to English for distribution to the DoD.

3.1.2.6 Checklists. The system shall have the capability to reconcile the database of foreign NOTAMs with the checklists provided by foreign NOTAM senders.

3.1.2.7 Storage. The system shall incorporate the capability to store completed NOTAMs in a database for dissemination and distribution.

3.1.2.8 Format. The system shall store NOTAMs in the correct format for the class of the NOTAM, e.g.,

International -	ICAO format
Domestic -	Domestic format
Military -	Class 1 format
Regulatory -	FDC format

3.1.2.9 Expiration Cancellations. The system shall automatically cancel NOTAM data based on NOTAM specific expiration time parameters.

3.1.2.10 Automatic Cancellation. The system shall be capable of automatically canceling NOTAM data based on receipt of correctly formatted cancellation messages, NOTAMCs or NOTAMRs.

3.1.2.11 Retaining Inactive NOTAMS. The system shall be capable of retaining inactive NOTAM data for a period of 72 hours after the cancellation of domestic, military, international and FDC NOTAMs.

3.1.3 User Access and Control.

3.1.3.1 Distribution Tables. The system shall provide the capability for the NOTAM Office Specialist to access and modify all NOTAM data and distribution tables.

3.1.3.2 Archive. The system shall provide the capability for the NOTAM Office personnel to access archived NOTAM data for a period of 90 days after cancellation in an off-line mode.

3.1.3.3 Administrative Messages. The system shall provide the NOTAM Office Specialist with the capability to send and receive SVC B administrative messages.

3.1.3.4 Read Only/Query Access. The system shall ensure that external users have read only query access to active NOTAMs.

3.1.4 NOTAM Distribution

3.1.4.1 Class. The system shall incorporate the capability to distribute NOTAMs without manual intervention to users and communication networks based on NOTAM class (international, domestic, military, regulatory) and/or NOTAM affected location.

3.1.4.2 Automatic. The system shall incorporate the capability to distribute NOTAMs without manual intervention to users based on a change of state (e.g., new, canceled or edited NOTAMs) and time (e.g., scheduled products and timer cancellation).

3.1.4.3 Formats. The system shall be capable of creating NOTAM report products in the formats specified in FAA Order 7930.2. The report products include military summary reports, military report chains, domestic report chains, NOTAM checklists and FDC lists.

3.1.4.4 Military Text. The system shall be capable of distributing, without manual intervention, military text for NOTAMs of interest to the DoD by referring to a list created by the user in the system which specifies the locations of DoD interest.

3.1.4.5 Distribution. The system shall distribute NOTAM report products by referring to a list created by the user which specifies report distribution to users and communications networks.

3.1.4.6 Query Access Capability. The system shall incorporate the query access capability to NOTAMs of interest based on specific parameters of accountability, location or NOTAM number.

3.1.4.7 Message Base Interface. The system shall incorporate the capability to interface with existing message based NOTAM users.

3.1.4.8 Communication Interface. The system shall interface with existing communication circuits, i.e., NADIN PSN (NADIN MSN and WMSCR), AWN and AUTODIN.

Threshold: Error-free transmission and reception of NOTAMs 97% of attempts made.

Objective: Error-free transmission and reception of NOTAMs 99% of attempts made.

3.1.4.9 Distribution. The system shall provide the capability to distribute any NOTAM to the DoD NIPRNET.

3.1.5 Distribution Table Maintenance.

The system shall provide the capability for the NOTAM Office specialist to control the collection, validation, maintenance and distribution of NOTAM data.

3.1.6 Operations Management.

3.1.6.1 Termination. The system shall incorporate the capability to terminate system services with no loss of data.

3.1.6.2 Audit Records. The system shall maintain audit records, including database and access history logs.

3.1.6.3 Ad Hoc Reports. The system shall provide the capability for the NOTAM Office personnel to read and search audit records and history logs and produce unscheduled reports.

3.1.6.4 Internal Safeguards. The system shall provide safeguards against the loss of data.

3.1.6.5 Storage. The system shall provide for the archival storage of applications and support software, NOTAM and distribution tables and audit records of the in production software versions and active NOTAM data..

3.1.6.6 Restore/Build. The system shall incorporate the capability to restore/rebuild the databases with no loss of data after a system failure has occurred.

3.1.6.7 Restore. The system shall provide the capability to restore records on an individual basis and to recover databases from system archives.

3.1.7 Monitor and Control.

The system shall have the capability to report transaction statistics. A transaction is defined as any single activity, e.g., query, the activation of a process, sending a message or receiving a message.

3.1.8 Software Development and Maintenance.

The system shall provide the capability for users designated by ATO to develop, test and maintain application software without interfering with the operational software. This capability shall include compilers, software libraries and utilities and configuration management tools that are required to modify, develop, test and operate the NOTAM application.

3.2 Product Characteristics and Performance Requirements.

3.2.1 Service Levels.

The following parameters shall be used in sizing the amount of required system processing capability and system storage capacity:

Threshold: An average of 3,000 new NOTAMs and 3,000 NOTAM cancellations will enter the system each day.

Threshold: A NOTAM will be active in the NOTAM database for an average of 10 days.

Threshold: An average of three (3) versions of the NOTAM Record (NR) will be maintained for each new NOTAM while the NOTAM is active.

Threshold: A canceled NOTAM will be retained as a suspended record for 72 hours prior to being archived.

Threshold: NOTAM versions will be retained in the archived data file.

Threshold: The text of a NOTAM will average 100 characters in length, a minimum of 20 characters and a maximum of 1,300 characters. NOTAM text that exceeds 1,300 characters will be submitted as a multi-part NOTAM.

Threshold: A copy of each input and each output NOTAM will be stored in the log files.

Threshold: The system will have the capability to operate a test database and a software maintenance database with no detrimental impact to the operational database.

Objective: The system will accommodate a 100 percent growth in NOTAM throughput during the next 5 years. This increase in growth is over and above the numbers stated above. The system shall experience no deterioration in response time and shall maintain the 50 percent margin in computing resources.

3.2.2 Availability.

System availability will be .999 with meantime to restore of 30 minutes. Availability is applied to minimum mission critical components. Minimum mission critical component is defined as any component which is required to process, store and disseminate NOTAMs. For example, two

NOTAM specialist workstations are required to process, store and disseminate NOTAMs. Four PCs may be available, therefore, would not be considered mission critical components until two fail.

3.2.3 Communications Standards.

System communication standards shall be defined in the Interface Requirement Documents (IRDs).

3.2.4 Product Performance.

For purposes of providing information, this section defines traffic transactions and response time needs for the current USNS workload. Traffic transactions are defined for the peak hour of operation. This section also provides parameters for sizing the amount of storage needed for the NOTAM data and provides margins needed to support anticipated growth.

3.2.4.1 Response Time. The system shall be capable of providing the response time that is required to meet peak hour traffic rate. The system shall meet the transaction rates and response times listed in Table 3-5.

TABLE 3-5. NOTAM TRANSACTION RATES AND RESPONSE TIME REQUIREMENTS

Transaction	Traffic Rate (number per peak hour)	Average Response Time (seconds)	97th Percentile Response Time (seconds)
New Domestic NOTAM	600	3	10
Domestic cancellation message	400	3	10
New Regulatory NOTAM	20	3	10
New Regulatory cancellation NOTAM	20	3	10
Military NOTAMN	50	3	10
Military NOTAMC	25	3	10
Military NOTAMR	10	3	10
Foreign International NOTAMN	180	3	10
Foreign International NOTAMC	80	3	10
Foreign International NOTAMR	25	3	10
Simple Query	500	2	5
Moderate Query	300	3	10
Complex Query	100	10	30
Report Summary Query	200	20	60
Military Summary Report Creation	5	100	300
Input Checklist Processing	5	100	360
Output Checklist Creation	1	100	360
New NOTAM Edit	200	3,10	10,25
Keystroke	not applicable	.1	.2

TABLE 3-5 NOTES:

- The response time for the four types of queries is measured from the time the last character of the request is received by the system until the response is queued for delivery to the user.

- A Simple Query is defined as a query for a specific NOTAM serial number identified by location; a Moderate Query is defined as a query for all NOTAMs for a location or accountability; a Complex Query is defined as a query incorporating accountability or location and date and time range; and a Report Summary Query is defined as a query for a copy of an already created DoD NOTAM report.

- Response time for generating a report summary and output checklist is measured from the reporting time (i.e., the cutoff time for including NOTAMs in the report) until the time the report is queued for delivery.

- Response time for NOTAM processing is measured from the time the last character of the input NOTAM arrives at the USNSR, until all outputs have been queued for delivery.

- Response time for processing an input checklist is measured from the time the request is received until the time the response message is queued for delivery.

- There are two response times associated with editing a new NOTAM. The first is measured from the time the user indicates that the edit is complete, until the time a response message is displayed on the screen indicating that the database has been updated. The second is measured from the time a user indicates that the edit is completed until the time that all output messages associated with the update are queued for delivery.

- Response time for a workstation keystroke is measured from the time the user depresses the key until the character is displayed on the screen.

3.2.6 Failure Detection.

The system shall be capable of detecting software abnormal abends and aborts and report to the NOTAM Office personnel via the monitor and control function.

3.2.7 Year 2000 Compliance.

The system shall be year 2000 compliant.

3.3 Computer Human Interface.

The Computer Human Interface (CHI) for the USNSR shall be the equivalent of the current operator interface software (Beehive software).

3.4 Staffing and Performance Requirements.

The system shall not require the development or introduction of new FAA job categories or skill classifications, over and above what is presently required for the operation and maintenance of the existing system by NOTAM Office Specialists, series 2152.

4.0 PHYSICAL INTEGRATION

4.1 Space.

A site survey shall be performed to determine the space required to house the system at the ATCSCC at Herndon, VA. The site survey shall address, e.g., maintenance accessibility requirements; heating, ventilation and air conditioning requirements; telecommunications requirements; and power requirements.

5.0 FUNCTIONAL INTEGRATION

5.1 Integration With Other NAS (and non-NAS) Elements.

5.1.1 The system shall integrate with all existing USNS communications circuits, including, NADIN MSN/AFTN (through NADIN PSN), NADIN PSN, AUTODIN, AWN, and WMSCR (through NADIN PSN).

5.1.2 The system shall integrate with the DoD GPS NOTAM Generator.

5.1.3 The system shall integrate with the DoD NIPRNET.

6.0 IN-SERVICE SUPPORT.

Contract support services shall be required to maintain and support the system during the intended service life.

7.0 TEST AND EVALUATION

7.1 Critical Operational Issues.

7.1.1 Does the USNSR provide the capability to generate, store and distribute NOTAM data to the NAS, DoD and International user communities?

7.1.2 Does the USNSR provide the NOTAM Office with the capability to monitor, edit and control the distribution of NOTAM data?

7.1.3 Does the USNSR provide the required availability?

7.2 Developmental Test and Evaluation (DT&E). This test and evaluation shall be performed by the vendor, with government oversight, at the vendor's facility.

7.3 Operational Test and Evaluation (OT&E). If determined to be required, this test and evaluation shall be performed by the government at the ATCSCC at Herndon, Virginia.

7.4 Independent Test and Evaluation (IOT&E). If determined to be required, this test and evaluation shall be performed by the government at the ATCSCC at Herndon, VA.

8.0 IMPLEMENTATION AND TRANSITION

8.1 A Program Implementation Plan (PIP) shall be prepared.

8.2 System implementation shall occur as an in-service transition.

8.3 Disruption to current system ongoing operations shall not exceed a total of four hours.

9.0 IN-SERVICE MANAGEMENT

9.1 The NOTAM Office will be responsible for the performance monitoring of the USNSR.

GLOSSARY

ACCC	Area Control Computer Complex
ADWS	Automatic Digital Weather Switch
AFSS	Automated Flight Service Station
AFTN	Aeronautical Fixed Telecommunications Network
AIS	Aeronautical Information System
AISR	Aeronautical Information System Replacement
ARTCC	Air Route Traffic Control Center
ATCT	Airport Traffic Control Tower
ATCSCC	Air Traffic Control System Command Center
AUTODIN	Automatic Digital Network
AWN	Automatic Weather Network
AWP	Aviation Weather Processor
CARF	Central Altitude Reservation Function
CHI	Computer Human Interface
CNS	Consolidated Notice to Airmen System
COTS	Commercial-off-the-shelf
DoD	Department of Defense
DLP	Data Link Processor
DT&E	Data Testing and Evaluation
DUAT	Direct Users Access Terminal
FAA	Federal Aviation Administration
FDC	Flight Data Center
FIAO	Flight Inspection Area Office
FSDPS	Flight Service Data Processing System
FSS	Flight Service Station
GPS	Global Positioning System
GUI	Graphical User Interface
HCI	Human Computer Interface
I-CASE	Integrated Computer-Aided Software Engineering
ICAO	International Civil Aviation Organization
IOC	Initial Operational Capability
IOT&E	Independent Operational Test and Evaluation
LABS	Leased A&B Switch
LAN	Local Area Network
MDB	Message Database

MPS	Maintenance Processing System
NADIN	National Aeronautical Data Interchange Network
NADIN MSN	National Aeronautical Data Interchange Network Message Switched Network
NADIN PSN	National Aeronautical Data Interchange Network Packet Switched Network
NAS	National Airspace System
NATCOM	National Communications Center
NCM	NOTAM Cancellation Message
NFDC	National Flight Data Center
NFDD	National Flight Data Digest
NND	NOTAM Needs Document
NODA	National Operational Data Archive
NOTAM	Notice to Airmen
NOTAMC	Cancel NOTAM
NOTAMR	Replacement NOTAM
NR	NOTAM Record
NRM	NOTAM Replacement Message
ODMS	Operational Data Management System
OE/AAA	Obstruction Evaluation/Airport Airspace Analysis
ORD	Operational Requirements Document
OSE	Open System Environment
OT&E	Operational Test and Evaluation
PIP	Program Implementation Plan
RD	Requirements Document
SDB	Suspense Database
SNOWTAM	Snow NOTAM
SVC	Service
TRACON	Terminal Radar Approach Control
TM	Traffic Management
TMP	Traffic Management Processor
USNOF	United States NOTAM Office
USNS	United States NOTAM System
USNSR	United States NOTAM System Replacement
WMSC	Weather Message Switching Center
WMSCR	Weather Message Switching Center Replacement
WX	Real-time environmental and weather data